Organic Chemistry CH 352-02 (Wilson)

Exam #4

April 21, 2005

Question 1 _______ (7)
Question 2 _______ (24)
Question 3 _______ (30)
Question 4 _______ (30)
Question 5 _______ (9)
BONUS _______ (4)

TOTAL _______ (100)

"The wrong answer is the right answer in search of a different question."
- Bruce Mau, Canadian designer
1. A new facial cream has come onto the market with the following advertisement text: “New! Combining the best of both alpha hydroxy acids and beta hydroxy acids, our new alpha beta dihydroxy acid facial treatment promises younger looking skin in half the time! Visit our salons today and try a risk free sample!” Evaluate these claims based on your knowledge of organic chemistry. Four sentences max, structures may also be helpful here!

Key things I was looking for… Discussion of alpha hydroxy acids being stronger than beta hydroxy acids (proximity effect) and an alpha beta dihydroxy acid would probably be stronger still (additive effect). Saying that you didn’t want to put it on your face may have been true, but didn’t get after the crux of what I was looking for…

2. Supply the missing products for all of the following six equations. Give complete answers. Be sure to keep in mind all the details that we have been working with throughout the semester! (4 pts each)

   a.  
   
   1) \( \text{CrO}_3, \text{H}_2\text{SO}_4 \)
   2) \( \text{NH}_3, \text{DCC} \)

   b.  
   4-methylpentanoic acid
   
   1) \( \text{EtOH, TsOH} \)
   2) \( \text{NaOEt, EtOH} \)
   3) \( \text{H}_3\text{O}^+ \)

   c.  
   
   1) \( \text{LDA, -78°C, THF} \)
   2) \( \text{Et-I, THF} \)
   3) \( \text{NaH, 0°C, THF} \)
   4) \( \text{PhCH}_2\text{I, THF} \)
(30) 3. Propose synthesis routes for **TWO** out of the following three compounds. Legal starting materials include **mono-functional** compounds of five carbons or less, dimethyl malonate, benzene, unsubstituted dithiane, bases for elimination and/or deprotonation (LDA and alkoxides are okay), ethylene glycol (for protection only!), and any inorganic reagent or solvent required to carry out the transformation (CN, PPh₃, NBS, DCC, NH₃, etc. are all inorganic). Carboxylic acids are legal, acid halides are NOT (but if you make them, okay!). Keep in mind there are many correct synthesis routes for each compound. (15 pts each)

Any reasonable route accepted.

(this space left blank for your answer to 3)
4. Give complete arrow pushing mechanisms for two of the next three equations. Be sure to include all relevant resonance structures and account for all products shown. You may use the back of this page if you wish. (15 pts each)
5. Given the following roadmap, give structures for A, B, and C. (3 pts each)

![Chemical structures and reactions]

A = ![Structure A]

B = ![Structure B]

C = ![Structure C]

(4) BONUS: Briefly describe one of your URC presentations, three sentences max. (Give me the subject area so that I can check against the program).

All reasonable answers accepted.